

**European Patent No. 998 539 (Application No. 98032436.3)  
of Rhodia Limited - Grounds of Appeal of the Patentee**

**Requests**

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The Patentee requests that the Decision of the Opposition Division to refuse the Main and first Auxiliary Requests considered at the Oral Proceedings is set aside and the patent maintained on the basis of one of the enclosed Main or first to third Auxiliary Requests.

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The Main Request corresponds essentially to the Main Request considered by the Opposition Division. Claim 7 was deleted from the Main Request at the commencement of the Oral Proceedings, and this claim is not present in the Requests under Appeal. Claims 7, 13, 14, 17 and 18 from the Main Request considered at the Oral Proceedings have been cancelled.

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Claims 1-11 and 13-17 of the Main Request are identical to claims 1-6, 8-12, 14, 15 and 18-20 of the application as granted. Claim 12 of the Main Request contains the correction of an error in the compound name of component (b) as discussed below, but in all other respects corresponds to claim 13 as granted.

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The Auxiliary Requests correspond to the Main Request with the limitation of the component definitions constituting the claimed compositions, with the corresponding deletion of redundant dependent claims and claim renumbering. The third Auxiliary Request additionally contains the limitation of the proportion ranges of the components in the composition.

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It is pointed out that the third Auxiliary Request is of equivalent scope to the second Auxiliary Request (without claim 7) which was allowed by the Opposition Division.

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The following submissions adhere to the document numbering used by the Opposition Division and given in point 5 of the Facts and Submissions of the Decision under Appeal.

**Rule 57a EPC**

In points 4.1 and 4.3 of the Decision under Appeal, the Opposition Division rejected the Main Request because it held that claims 13 and 14, which were dependent claims  
5 introduced during the Opposition procedure, were not added in response to a ground for opposition. The Main Request was therefore rejected because it was not in compliance with Rule 57a EPC.

Dependent claims corresponding to the subject-matter of claims 13 and 14 of the Main  
10 Request before the Opposition Division are not present in the enclosed Requests. Consequently, this objection under Rule 57a EPC is not relevant to the Requests forming the basis of the Appeal.

**Main Request (A. 123(2) and 100(c) EPC)**

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Claim 1 of the Main Request (and claim 1 as granted) is based upon claim 1 as filed and the corresponding portion of the description at page 2, line 21 to page 3, line 3. Reference to octafluoropropane (R218) was deleted from the definition of component (a) (component (iii) as granted) prior to grant. The removal of a single component from  
20 a list of alternatives does not introduce a new technical teaching to the skilled person.

The composition range of component (i) (corresponding to component (b) as filed) was limited to the range of 30 to 50% by weight in claim 1 before grant. Basis for this amendment is found in the broadest range of 30 to 94% and the preferred general range  
25 of 50 to 90% by weight of component (b) disclosed at page 3, lines 36-37 of the application as filed.

It is settled case law in accordance with T 2/81 (Headnote, point 2 and Reasons for Decision, point 3) that:

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*"the disclosure of a quantitative range of values (e.g. for concentrations or temperatures) together with an included preferred narrower range also directly discloses the two possible part ranges lying within the overall range on either side of the narrower range"*

The claimed range of 30 to 50% by weight for component (i) is therefore unequivocally disclosed in the application as filed.

5 The composition range of component (ii) (corresponding to component (c) as filed) was limited to the range of 1 to 4% by weight in claim 1 prior to grant. Basis for this amendment is found in the broadest range of 1 to 10% and the particularly preferred range of 3 to 4% by weight disclosed in the application as filed at page 3, lines 10-12.

T 2/81 (Headnote, point 2) states that:

10 *"a simple combination of the preferred narrower range and one of these part-ranges is also unequivocally derivable and supported in the disclosure"*

Consequently, the range of 1 to 4% by weight for component (ii) is directly derivable from the application as filed and does not introduce a new technical teaching.

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It is pointed out that each of the broadest, and preferred ranges relied upon for the amendments in the present Main Request are disclosed in the application in a general sense, in separate paragraphs (page 3, lines 10-13 and line 36 to page 4, line 1). They are neither associated with particular compounds specified for each component nor associated with particular ranges for the other components forming the refrigerant composition. Consequently, these disclosures represent generic ranges for each component which can therefore be combined without the introduction of a new technical teaching which was not present in the application as filed.

25 Component (iii) in claim 1 of the Main Request is recited to constitute "the remainder, not exceeding 60% by weight" of the composition. This amendment was carried out during the examination of the application. Basis for this upper limit of component (iii) is found in claim 1 and page 2, line 27 and page 3, line 29 of the application as filed.

30 As clearly stated in page 2, paragraph 2 of the Representative for the Patentee's letter of 3 May 2001:

*"in claim 1 the amount of component (i) is now specified to be 30% to 50% while the concentration of component (iii) constitutes the remainder after component (i) and (ii)".*

Components (i), (ii) and (iii) therefore account for 100% by weight of the compositions of the invention. Basis for this amendment is found at page 3, lines 14-18 of the application as filed, which explains that in those cases where components (i) and (iii) (components (a) and (b) as filed) are both chosen to be only pentafluoroethane (R125), the composition is binary with the amount of R125 being from 90 to 99% by weight. As is apparent from claim 5 as filed, this range of 90 to 99% R125 leaves 1 to 10% by weight of component (ii) (component (c) as specified in claim 1 as filed) to make up the remainder of the composition. In all other situations, the composition is stated to be at least ternary. Quaternary (or higher order) compositions occur in the present invention when more than one chemical compound is selected to constitute at least one of components (i), (ii) or (iii).

It is further pointed out that the broadest ranges for the three components as filed, namely 30 to 94% (component (i)/(b)), 1 to 10% (component (ii)/(c)) and 5 to 60% by weight (component (iii)/(a)) provide limits which account for 100% by weight of the composition (94/1/5 and 30/10/60). All of the Examples also disclose compositions comprising 100% by weight of compounds chosen from the original definitions of components (i), (ii) and (iii) (octafluoropropane (R218), which is present in Examples 4 and 5, does not fall within the definitions of components (i) to (iii) as granted).

Furthermore, there is no disclosure anywhere in the application as filed that the refrigerant composition may comprise additional components, or what these components may be. For these reasons, the composition according to claim 1 of the present Main Request is unequivocally based upon the disclosure of the application as filed and does not introduce a new technical teaching.

In 5.3 of the Decision under Appeal, the Opposition Division concluded that claim 1 as granted (which is of identical scope to claim 1 of the Main Request under Appeal), was in violation of Article 123(2) EPC. The Opposition Division held that the individual ranges specified by components (i), (ii) and (iii) were disclosed in the application as filed. The Patentee agrees with this conclusion for the reasons outlined above.

However, the Opposition Division erroneously concluded that the actual ranges of components (i), (ii) and (iii) which result from the conditions of the claim were not present in the application as filed. The Division stated on page 7 of the Decision that:

5       *"It can be directly derived that there are several compositions which do not add up to 100%.... This means that the actual feasible ranges are:*  
              (i) 36 to 50 wt-%  
              (ii) 1 to 4 wt-%  
              (iii) 46 to 60 wt-%"

10       This reasoning is the inevitable consequence from the working of the claim, which after specifying components (i) and (ii) with their relevant proportions, requires that up to 60% by weight of component (iii) form the **remainder** of the composition i.e. that the total of components (i), (ii) and (iii) equal 100% by weight of the composition.

15       It is pointed out that the actual ranges of the components in the composition once the requirements of the claim are met are **directly derivable** from the ranges disclosed in the application as filed, as conceded by the Opposition Division. There can therefore be no new technical teaching to the skilled person in a composition which is the inevitable result of component ranges unequivocally disclosed in the application as filed. For these reasons, the composition according to claim 1 does not introduce new  
20       subject-matter not present in the application as filed. Claim 1 therefore meets the requirements of Article 123(2) EPC.

Independent claim 4 of the Main Request differs from claim 1 in that the range of component (i) (corresponding to component (b) as filed) is specified to be 50 to 75% by  
25       weight. Basis for this range is found in the application as filed at page 3, lines 36-37 in the generally preferred range of 50 to 90% and the especially preferred range of 75 to 90% by weight. In accordance with T 2/81 as discussed above, these ranges unequivocally disclose the claimed range of 50 to 75% as the part range lying on one side of the preferred range.

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It is also pointed out that after specifying ranges for components (i) and (ii), claim 4 requires that the remainder of the composition be component (iii), in a similar manner to claim 1. This represents a directly derivable range of 21 to 49% by weight for component (iii). This range is within the broadest range of 5 to 60% by weight

originally disclosed for this component (claim 1 and page 2, line 27 and page 3, line 29 of the application as filed).

5 Basis for claim 2 is found at page 3, lines 36-37 of the application as filed, in the specific disclosure of the lower limit in the range of 50 to 90% by weight.

Basis for claims 3 and 5 is found at page 3, lines 22-23 of the application as filed, which state that component (b) (corresponding to component (i)) preferably comprises R125 (pentafluoroethane) and/or R134a (1,1,1,2-tetrafluoroethane).

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Basis for claim 6 is found at page 3, lines 21-22 of the application as filed, which states that R125 (pentafluoroethane) is preferred as component (a) (corresponding to component (iii) in the Requests).

15 Basis for claim 7 (corresponding to claim 8 as granted) can be found in the disclosure of the more preferred range of 2 to 5% and the particular range of 3 to 4% at page 3, lines 10-12 of the application as filed. In accordance with T 2/81, as discussed above, the combination of the preferred narrow range of 3 to 4% and the part range of 2 to 3% i.e. 2 to 4%, is unequivocally derivable from the application as filed.

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Basis for claim 8 (corresponding to claim 9 as granted) is found in claim 3 and page 3, line 12 of the application as filed. Basis for claim 9 (corresponding to claim 10 as granted) is found at page 4, lines 2-8 of the application as filed. Basis for claim 10 (corresponding to claim 11 as granted) is found in claim 11 and page 4, lines 2-4 of the application as filed. Basis for claim 11 (corresponding to claim 12 as granted) is found  
25 in claim 12 and page 4, lines 8-9 of the application as filed.

Basis for claim 12 (corresponding to claim 13 as granted) is found at page 4, lines 10-16 of the application as filed. The Patentee has noted an error in the corresponding  
30 claim 13 as granted, which specified 1,1,1,3-tetrafluoroethane as component (b). Such a compound name is impossible, requiring the presence of at least 3 carbon atoms, while an ethane has only 2. It would therefore be apparent to the skilled person that an error had occurred.

The correction of this error would also have been unambiguously apparent to the skilled person, because it is clear from the application as filed that component (b) can comprise 1,1,1,2-tetrafluoroethane (R134a) (page 2, line 29 and claim 1 as filed) and that this compound was preferred (page 3, lines 22-23; page 4, lines 10-16 and claims 4 and 6 as filed). The correction of this obvious error is therefore requested under Rule 88 EPC.

Basis for claim 13 (corresponding to claim 14 as granted) is found in claim 15 and page 1, lines 9-11 of the application as filed. Basis for claim 14 (corresponding to claim 15 as granted) is found at page 1, lines 9-19 of the application as filed. Basis for claim 15 (corresponding to claim 18 as granted) is found in claim 16 and page 3, lines 4-7 of the application as filed. Basis for claim 16 (corresponding to claim 19 as granted) is found in claim 17 and page 3, lines 7-9 of the application as filed. Basis for claim 17 (corresponding to claim 20 as granted) is found at page 1, lines 9-12 and page 3, lines 7-9 of the application as filed.

For these reasons, the Main Request meets the requirements of Article 123(2) EPC.

#### **Main Request - Additional comments**

The amendment to claim 1 specifying component (iii) "not being less than 5%" in the Requests considered by the Opposition Division has been removed from the enclosed Requests. This amendment does not alter the scope of the claim and therefore is not accorded by a ground of Opposition as required by Rule 57a EPC.

This amendment was necessitated by the Opposition Division's reasoning in point 6.2 of the Preliminary Opinion where it stated that:

*Even though additional components may be present to an unlimited extent due to the feature "comprising", it is clear that said original claim requires a mandatory presence of said component (a) (or (iii)) of at least 5% based on the weight of the composition.*

*Independent claim 1 of the patent-in-suit no longer contains said mandatory requirement. Independent claim 1 encompasses (due to the feature "comprising") any composition comprising 30-50 wt-% of component (i) and 1-*

*4 wt-% of component (ii), the rest can be any randomly chosen component. Said independent claim 1 encompasses therefore compositions comprising no component (iii) at all or compositions comprising component (iii) in an amount of >0 and <5 wt-%. There appears to be no basis in the application as filed for these two possibilities and independent claim 1 violates the requirements of Art. 123(2) EPC.*

*The same objection applies to independent claims 4, 14, 18 and 19 as well.*

- 10 In complete contrast to this reasoning that the composition of claim 1 could contain other unspecified components, in point 5.3 of the Decision under Appeal, the Opposition Division held that claim 1 of the first Auxiliary Request was in violation of Article 123(2) EPC because "*It can be directly derived that there are several compositions which do not add up to 100%*" i.e. the claim was held to require that it
- 15 comprised only components (i), (ii) and (iii) and that the proportions of these components must therefore account for the entire weight of the composition.

- It is unambiguously clear from the phrase "with the remainder... being (iii)..." present in the independent composition claims that the refrigerant compositions must only contain
- 20 compounds selected from components (i), (ii) and (iii), such that other unspecified components are excluded. In such a claim 1, the minimum amount of component (iii) constituting the remainder of the composition is 46% by weight (obtained when 50% by weight of component (i) and 4% by weight of component (ii) is present).

- 25 Any limitation of the proportion of component (iii) to "not being less than 5%" in the composition claims is therefore redundant and an amendment not accorded by a ground of opposition (Rule 57a). This unnecessary amendment has therefore been omitted from the independent composition claims of the enclosed Requests.

30 **First Auxiliary Request (A. 123(2) and 100(c) EPC)**

The first Auxiliary Request corresponds to the Main Request with the limitation of the chemical compounds which constitute components (i), (ii) and (iii) in claims 1 and 4.

Basis for the limitation of component (i) to pentafluoroethane and/or 1,1,1,2-tetrafluoroethane is found at page 3, lines 21-23 of the application as filed, which state that component (b) (corresponding to component (i)) preferably comprises R125 (pentafluoroethane) and/or R134a (1,1,1,2-tetrafluoroethane).

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Basis for the limitation of component (ii) to a hydrocarbon of 4 or 5 carbon atoms (i.e. n being 4 or 5) is found at page 4, lines 2-4 of the application as filed.

10 Basis for the limitation of component (iii) to pentafluoroethane is found at page 3, lines 21-22 of the application as filed, which state that component (a) (corresponding to component (iii)) preferably comprises R125 (pentafluoroethane). This limitation of the definition of component (iii) has resulted in the deletion of the claim corresponding to claim 6 of the Main Request, which is redundant.

15 For these reasons, the first Auxiliary Request therefore meets the requirements of Article 123(2) EPC.

#### **Second Auxiliary Request (A. 123(2) and 100(c) EPC)**

20 The second Auxiliary Request corresponds to the first Auxiliary Request with the further limitation of the chemical compounds which constitute components (i) and (ii) in the compositions of independent claims 1 and 3.

25 Basis for the limitation of component (i) to 1,1,1,2-tetrafluoroethane is found at page 3, lines 21-23 of the application as filed, which state that component (b) (corresponding to component (i)) preferably comprises R134a (1,1,1,2-tetrafluoroethane). This has resulted in the deletion of the claims corresponding to claims 3 and 5 of the first Auxiliary Request, which no longer fall within the amended definition of component (i).

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Basis for the limitation of component (ii) to n-butane is found at claim 12 and page 4, lines 8-9 of the application as filed. This has resulted in the deletion of the claims corresponding to claims 8 and 9 of the first Auxiliary Request, the former no longer

falling within the amended definition of component (ii), while the latter is rendered redundant by limited definition.

For these reasons, the second Auxiliary Request therefore meets the requirements of  
5 Article 123(2) EPC.

### **Third Auxiliary Request (A. 123(2) and 100(c) EPC)**

The third Auxiliary Request corresponds to the second Auxiliary Request with the  
10 further limitation of claim 1 to 50% by weight of component (i), 1,1,1,2-tetrafluoroethane. Basis for this amendment is found at page 3, lines 36-37 of the application as filed, in the specific disclosure of the lower limit in the range of 50 to 90% by weight.

15 This amendment to claim 1 has resulted in the deletion of the claims corresponding to claims 2 and 3 of the second Auxiliary Request, which are redundant over the proportion of component (i) required by the composition of claim 1.

For these reasons, the third Auxiliary Request therefore meets the requirements of  
20 Article 123(2) EPC.

### **All Requests (A. 123(3) and 100(c) EPC)**

Claims 1-11 and 13-17 of the Main Request are identical to claims 1-6, 8-12, 14, 15 and  
25 18-20 as granted. Claim 12 contains the correction of the compound name of component (b) to 1,1,1,2-tetrafluoroethane, one of the compounds constituting component (i) in composition claims 1 and 4. The proportion of 1,1,1,2-tetrafluoroethane specified in claim 12, namely 50% by weight, with the proportions for components (a) and (b), which together define the composition, fall within the ranges  
30 according to claims 1 and 4 as granted. Consequently, this correction does not extend the scope of protection of the Main Request beyond that afforded by the granted composition claims.

The first to third Auxiliary Requests limit the compounds constituting components (i), (ii) and (iii) of the claimed composition. Each of the limited component definitions fall within the scope of the component definitions as granted. Consequently, the amended component definitions do not extend beyond the scope of the components specified in  
5 the composition claims as granted.

The third Auxiliary Request also limits the ranges of the components (i) and (iii) in the claimed composition. The restricted ranges fall within the range of the proportions allowed by claims 1 and 4 as granted. The limitation of the proportions in composition  
10 claim 1 of the third Auxiliary Request therefore does not extend the scope of protection beyond the composition claims as granted.

For these reasons, the Main and first to third Auxiliary Requests meet the requirements of Article 123(3) EPC.  
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**Novelty (A. 54 and 100(a) EPC)**

During the Opposition proceedings, D1 and D2 were cited against the novelty of the Requests. The Patentee agrees with the Opposition Division's conclusions in relation to  
5 the novelty of the second Auxiliary Request in sections 6.8 and 6.9 of the Decision under Appeal.

The analysis of the Opposition Division in relation to the novelty of the second Auxiliary Request pertained to a composition limited to R125, R134a and R600. The  
10 Patentee therefore considers the Opposition Divisions finding on novelty to be equally applicable to the Requests forming the basis of the Appeal. Although the claims of the Main and first Auxiliary Requests contain alternative compounds constituting components (i), (ii) and (iii), no novelty objections were raised against these alternative formulations during the Opposition procedure.

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At the Oral Proceedings, the Opponent failed to establish that D1 was made available to the public prior to the filing date of the patent. The Patentee is in complete agreement with reasons (a) to (c) and the Division's conclusion in (d) on page 14 of the Decision. D1 has not been shown to be prior art under Article 54 EPC and is therefore not  
20 available for the analysis of novelty or inventive step.

However, should the Appeal Board reverse this Decision and find that D1 was made available to the public before the filing date of the patent, it is requested that the analysis of the priority claim which will result from such a finding is remitted to the  
25 Department of first instance for consideration, in accordance with established practice. This will afford the Opposition Division an opportunity to rule on the priority claim for the first time, and provide both the Patentee and Opponent with the option of Appealing any Decision on this point.

30 With regard to D2, it is pointed out that there is no explicit disclosure of a blend falling within the scope of the compositions defined in the Requests. Table 1 at page 2 of D2 discloses a list of 10 possible blend components, including pentafluoroethane (R125), 1,1,1,2-tetrafluoroethane (R134a), 1,1-difluoroethane (R152a) and n-butane (R600). Five compositions, which are ternary or quaternary, formulated from the compounds of

Table 1 are shown in Table 2 at page 3 of D2. When a hydrocarbon is present in the selected blends, it is propane (R290), propylene (R1270) or 2-methyl propane (R600a). None of these hydrocarbons fall within the definition of component (ii) in the present Requests.

5

Furthermore, the only disclosure of specific blend proportions is in relation to R125/R134a compositions containing 2-methyl propane (R600a) found in Table 3 at page 4 of D2. Methyl propane is specifically excluded from the definition of hydrocarbon component (ii) in the Requests. There is thus neither explicit disclosure in  
10 D2 of a ternary composition containing n-butane nor a disclosure of the particular proportions for n-butane containing compositions required by the composition claims of the present Requests.

There is also no implicit disclosure of compositions in D2 falling within the scope of  
15 the Requests. It is accepted Case Law that novelty resides in the preparation of a mixture which comprises two chemical entities, each of which has been selected from a list of compounds of some length (T 401/94). In order to generate a ternary component mixture falling within the scope of the present claims from the disclosure of D2, multiple selections from various lists and disclosures are required.

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Starting from the general disclosure of <sup>D2</sup>~~D1~~, a ternary mixture must first be selected. Then, three further selections must be made from the list of 10 possible blend components in Table 1. It is pointed out that from all the hundreds of possible ternary blends which can be generated from Table 1, there are only two possible ternary blends  
25 falling within the compositions of the Main Request, and one possible blend falling within the scope of the Auxiliary Requests.

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After all of these selections, a further selection of appropriate component proportions must be carried out. It is pointed out that there is no generic disclosure of proportions suitable for ternary formulations in D2. The only specific proportions for ternary compositions are disclosed in relation to R125/R134a/R600a blends in Table 3. These blends contain methyl propane, which does not fall within the definition of hydrocarbon component (ii) in the Requests. There is no indication that the proportions in Table 3 are generally applicable to other ternary formulations and they must therefore be held to

be disclosed only in relation to R125/R134a/R600a blends. There is thus no implicit disclosure of a composition falling within the scope of the Requests under Appeal.

5 In the absence of a generic disclosure of blend proportions, and the requirement to perform three selections of specific blend components from the list of ten possibilities in Table 2 to produce a ternary blend, the compositions according to the present Requests are novel over D2.

10 The Opposition Division's analysis of the disclosure of D2 with regard to novelty is discussed in section 6.9 of the Decision under Appeal. The analysis is based upon the Example of a blend of 50 wt-% R134a, 4 wt-% R600a and 46 wt-% R125 disclosed in Table 3. This Example represents a specific point in the disclosure of D2, which completely characterises a particular ternary composition. The consideration of the implicit disclosure of a document for the examination of novelty does not extend to the  
15 modifications of specific Examples. Consequently, it is submitted that the Opposition Division was in error when it considered the possible combination of the specific disclosure of an Example from Table 3 of D2 with a general disclosure of blend substituents from in Table 1 when examining the novelty of the Requests. Such a combination of subject-matter does not form part of the disclosure of D2 for the  
20 analysis of novelty.

For these reasons, the compositions according to the present Requests are novel over the disclosure of D2. Consequently, remaining claims of the Requests, which are all directly or indirectly dependent upon the composition claims, are also novel over D2.  
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**Inventive Step (A. 56 and 100(a) EPC)**

The Patentee accepts D2 as an appropriate choice of closest prior art. According to D2, Summary, this document is concerned with the search for replacements for the ozone  
5 depleting refrigerant R22 (dichlorofluoromethane).

D2 discloses a number of possible blend components for R22 replacement compositions in Table 1, including the hydrocarbons propane, propylene, butane and methyl propane. Of these hydrocarbons, only butane falls within the definition of  
10 hydrocarbon component (ii) in the requests. However, n-butane is not disclosed in D2, either explicitly or implicitly, in any refrigerant compositions, for the reasons stated in the analysis of novelty.

Table 2 of D2 discloses five compositions, which are ternary or quaternary, formulated  
15 from the components of Table 1. The hydrocarbon-containing formulations in Table 2 comprise propane, propylene or methyl propane. Performance testing was carried out on blends of R125 (pentafluoroethane)/ R134a (1,1,1,2-tetrafluoroethane) /R600a (methyl propane) in the specific proportions disclosed in Table 3. None of these particular refrigerant compositions include a hydrocarbon according to the definition of  
20 component (ii) in the claims of the Requests.

As is explained in paragraphs [0003]-[0005] of the patent as granted, hydrocarbon components such as propane, propylene or methyl propane are present in the prior art formulations developed to replace R22 because they provide compatibility with  
25 lubricants ordinarily used in R22 refrigeration equipment.

However, the presence of these hydrocarbon components in the commercial formulations creates flammability problems in the fractionated vapour above the liquid refrigerant compositions. Such fractionated vapour represents the composition of the  
30 gas which could be released from a sealed refrigeration system upon leakage. Any reduction in the flammability of the vapour phase of a refrigerant composition is therefore an important safety advantage.

It was surprisingly found in the present invention that the presence of a hydrocarbon with at least 4 carbon atoms other than methyl propane greatly reduced the flammability of the fractionated composition.

## 5 Inventive step - Main and first Auxiliary Request

One problem addressed by the compositions according to the Main and first Auxiliary Requests in the light of the disclosure of D2 is the provision of alternative refrigerant compositions, useful to replace R22, having reduced flammability upon leakage.

10

As stated in paragraph [0005] of the present invention, it was surprisingly found that if a hydrocarbon with at least 4 carbon atoms other than methyl propane was present in R22 replacements instead of those hydrocarbons previously advocated in the prior art, the flammability of the fractionated composition is greatly reduced.

15

This advantage is evident from the worst case fractionation study discussed at paragraphs [0016] and [0017], and according to flammability test ASTM E 681-85. Results on page 5 show that the fractionated vapour obtained from the 46 wt-% R125/ 50 wt-% R134a/ 4 wt-% R600a (methyl propane) composition of (comparative)

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Example 2 is flammable, while the corresponding inventive composition of Example 1, which replaces R600a (methyl propane) with R600 (n-butane) is nonflammable. It is important to note that (comparative) Example 2 corresponds to the prior art composition disclosed as the second blend in Table 3 of D2.

25

Propane, propylene and methyl propane were selected for the prior art formulations, such as those disclosed in Table 2 of D2, because they possess appropriate boiling points in relation to the fluorocarbon components of the refrigerant compositions. None of the specific blends disclosed in Table 2 of D2 contain n-butane. Indeed, n-butane and those higher hydrocarbons according to component (ii) of the inventive compositions have higher boiling points compared to propane, propylene and methyl propane and would not have been obvious alternative. For example, n-butane has a boiling point of  $-0.5^{\circ}\text{C}$ , while methyl propane has a lower boiling point of  $-11.7^{\circ}\text{C}$ , which is much closer to that of the fluorocarbon components of the prior art compositions (see Table 1 of D2). There is no teaching in D2 which would have lead

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the skilled person to replace methyl propane with n-butane in the blends of D2 in the expectation of reducing the flammability of the fractionated composition.

It is also apparent from paragraph [0005] of the patent under Appeal that the National  
5 Institute of Standards & Technology computer programs REFPROP (commonly known as REFPROP) and REFLEAK predicted that a particularly preferred n-butane containing composition would be flammable. In reality it is not. Consequently, such theoretical calculations would have represented a technical prejudice against the skilled person investigating R22 replacement compositions containing n-butane as the  
10 hydrocarbon component.

None of the other cited art teaches that replacing methyl propane with another hydrocarbon with at least 4 carbon atoms would provide refrigerant compositions for the replacement of R22 with reduced flammability.

15

For these reasons, compositions of the Main and first Auxiliary Requests are inventive over the disclosure of D2, optionally in combination with one of D3-D8. Consequently, the remaining claims of the Requests, which are all directly or indirectly dependent upon the composition claims, are also inventive over the cited art.

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### **Inventive step - second and third Auxiliary Requests**

The component definitions in the second and third Auxiliary Requests are limited to 1,1,1,2-tetrafluoroethane as component (i), n-butane as component (ii) and  
25 pentafluoroethane as component (iii). The analysis of the Opposition Division in point 6.10 of the Decision under Appeal was carried out in relation to compositions limited to such components. The present third Auxiliary Request contains equivalent component proportions to those examined by the Opposition Division.

30 The Patentee is in complete agreement with the Division's analysis and finding of inventive step over the cited documents. The Patentee also believes that the same reasoning is also applicable to the second Auxiliary Request, which differs only in the breadth of the ranges of the 1,1,1,2-tetrafluoroethane and pentafluoroethane components in the compositions.

Taking D2 as closest prior art, one problem addressed by the compositions of the second and third Auxiliary Requests is the provision of alternative refrigeration compositions, useful to replace R22, having similar efficiency performance and  
5 reduced flammability upon leakage. This is an identical technical problem to that framed by the Opposition Division in its Decision.

The Table at lines 20 to 34 of page 4 of the patent under Appeal compares the refrigeration performance of a composition according to the second and third Auxiliary  
10 Requests (Example 1), with two compositions disclosed in Table 3 of D2 (Examples 2 and 3). Examples 2 and 3 contain methyl propane as the hydrocarbon component, while example 1 according to the invention contains n-butane.

It is apparent that Example 1 has a superior coefficient of performance (COP)  
15 compared to the COP of (comparative) Examples 2 and 3 in the temperature range of -15 to 5°C studied. Example 1 also exhibits COP comparable to those of R22 in the temperature range examined. The COP of (comparative) Examples 2 and 3 (blends according to D3, Table 3) is inferior to both Example 1 of the invention and R22.

20 There is no teaching in D2 which would have lead the skilled person to replace the methyl propane component of the compositions according to Table 3 of D2 with n-butane in the expectation of achieving improved COP (compared with the corresponding methyl propane containing composition) or COP similar to R22. In addition, none of the other cited art provides such a teaching.

25 It is also pointed out that the arguments submitted in relation to the inventive step of the Main and first Auxiliary Requests are also applicable to the second and third Auxiliary Requests. There is no teaching in the cited art which would lead the skilled person to substitute n-butane for methyl propane when attempting to provide a refrigerant  
30 composition of reduced leak flammability.

For these reasons, the compositions of the second and third Auxiliary Requests are inventive over D2, optionally in combination with one of D3-D8. Consequently, the

remaining claims, which are all directly or indirectly dependent upon the composition claims, are also inventive over the cited art.

**Sufficiency (A. 83 and 100(b) EPC)**

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The Opposition Division held in point 6.11 of the Decision under Appeal that there was no need to discuss the Opponent's insufficiency objection in view of the amended claims according to the second Auxiliary Request (which corresponds to the third Auxiliary Request under Appeal). The following comments address this issue in relation to the other Requests.

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During the Opposition proceedings, the Opponent argued in point 2 of its letter of 8 July 2003 that certain of the claims were insufficient because the various component ranges could be used to provide compositions which contained less than 100% by weight total ingredients. This objection arises as a result of a misconception regarding the wording and scope of the composition claims.

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It is pointed out that independent composition claim 1 of the Main, first and second Auxiliary Requests specifies three components, with components (i) and (ii) required in particular ranges, and component (iii) being the remainder of the composition. As has already been discussed, the definition of the composition in claim 1 does not provide any scope for additional ingredients. There is therefore no burden placed on the skilled person to determine supplemental components for the compositions according to claim 1.

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It is also pointed out that composition claim 4 according to the Main and first Auxiliary Requests, composition claim 3 according to the second Auxiliary Request and composition claim 1 according to the third Auxiliary Request define compositions which total 100% by weight of components (i), (ii) and (iii), such that there is no scope for the skilled person to investigate supplemental components.

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For these reasons, the subject-matter of the claims of all the Requests is described in a manner sufficiently clear and complete for it to be carried out by the skilled person. The requirements of Article 83 EPC are therefore met for all of the Requests.

**Conclusion**

5 The Appeal Board is requested to set the Decision of the Opposition Division aside, and  
maintain the patent on the basis of the Main or the first, second or third Auxiliary  
Requests.

10 If the Appeal Board is minded to take a Decision adverse to the Patentee on the basis of  
the papers, Oral Proceedings are requested.

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Professional Representative